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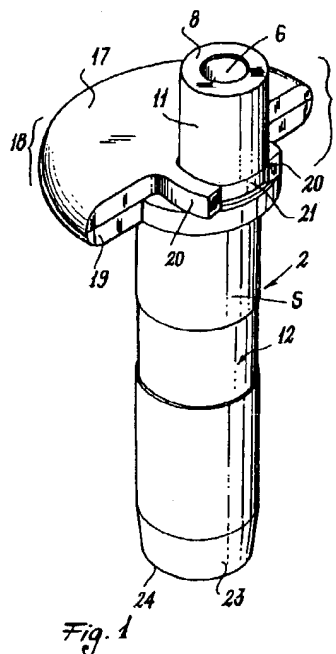
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**I-21025 Comerio (Varese) (IT)**(54) **Motor-compressor unit, in particular for refrigerators.**

(57) A motor-compressor unit, in particular for refrigerators, comprises a drive shaft (1) with its own lateral surface and arranged to drive usual means for compressing a refrigerant fluid. The shaft (1) comprises a collar (13) projecting from said lateral surface (s) extending about at least part of its circumference, said collar (13) acting as a support for a counterweight (18) having at least a part resting on it and comprising a part to be engaged with a corresponding seat provided in said surface.

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This invention relates to a motor-compressor unit, in particular for refrigerators, of the type comprising an electric motor rotating an output or drive shaft having its own lateral surface and arranged to drive usual means for compressing a fluid, in particular a refrigerant fluid, and a compressor casing relative to which the shaft moves.

A drive shaft of the aforesaid type supports a usual counterweight for balancing the forces generated by the masses rigid with said shaft during their movement.

The counterweight can form an integral part of the shaft as in the case of cast shafts, usually of cast iron, in which in addition to the eccentric part and concentric part, the casting also comprises the counterweight. Alternatively the counterweight can be formed separately and then be joined to the actual shaft by methods of greater or lesser complexity and cost, depending on the technical and functional characteristics of the counterweight.

Usually said counterweight is joined to the drive shaft by operations (eg. welding) which require a time representing a not inconsiderable part of the finished compressor manufacturing time.

It is known to form a drive shaft provided with a crank at that end to be connected to the compression means. This crank defines a shaft part to cooperate with the counterweight to be mounted on said end.

With this method the lower surface of the counterweight cooperates with a corresponding contact surface provided in the compressor casing, to support the drive shaft.

It is evidently necessary to ensure a precise and repeatable positioning of the counterweight on the shaft in order to ensure correct bearing between the drive shaft (via said lower surface of the counterweight) and the corresponding surface of the compressor casing.

Although this method quickens the manufacture of the motor and finished compressor, further operations are required to perfectly balance the counterweight on the shaft. Without this balancing, considerable and well known problems could arise in the motor-compressor unit during its use.

An object of the present invention is to provide a motor-compressor unit of the stated type in which the joint between the drive shaft and the relative counterweight can be made easily, quickly, and reliably.

A further object is to provide a motor-compressor unit which is of lower cost than known constructions and in which special balancing operations are not required in joining the counterweight to the shaft.

A further object is to provide a motor-compressor unit which is of lower cost than known constructions and in which the counterweight joined to

the shaft does not cooperate in any way in supporting the shaft on the compressor casing.

A further object is to provide a motor-compressor unit in which the drive shaft and the relative counterweight are of such shape as to facilitate their reliable joining.

These and further objects which will be apparent to the expert of the art are attained by a motor-compressor unit of the aforesaid type, characterised in that the shaft comprises a collar projecting from its lateral surface and extending about at least part of its circumference, said collar acting as a support for a counterweight having at least a part resting on it.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a perspective view of a shaft for a motor-compressor unit in accordance with the invention;

Figure 2 is a longitudinal section through the shaft of Figure 1; and

Figure 3 is a side view of the shaft of Figure 1.

In said figures the reference numeral 1 indicates the drive shaft of a usual motor-compressor unit. This shaft has a body 2 with an outer surface S, said body 2 being hollow at 5. The cavity 5 opens, at 6 and 7, at the ends 8 and 9 of the shaft 1.

In proximity to the end 8, the shaft 1 is coupled to usual compression means (not shown) in known manner, via a part 11 having its axis W parallel to but displaced from the axis K of the remaining part 12 of the body 2.

This latter, between said parts 11 and 12, comprises a protecting collar 13 extending about at least part of the circumference of its surface S.

The collar 13 is formed by cold-forming the shaft 1, and comprises, in cross-section, two overlying flanges 13A and 13B defining a flat surface P on which one side 17 of a counterweight 18 rests.

This collar comprises a lower portion or surface 13F arranged to cooperate with a usual compressor casing (not shown) for supporting the shaft 1 on said casing.

The counterweight comprises a folded part 19 arranged to lie coplanar with and adjacent to the collar 13 and at least partly surrounding it.

Said side 17 comprises two projecting arched arms 20 which are at least partly elastically deformable (for example because of the elasticity of the metal defining the counterweight 18, formed preferably from a blanked and folded metal plate) and are arranged to cooperate with an annular seat 21 provided in the part 11 of the body 2. This seat is adjacent to the collar 13 and enables the counterweight 18 to be easily arranged on the shaft 1 in a position perpendicular to the axis K or W of said

shaft.

Finally, at the end 9 there is provided a cap 23 flared at its free end 24, to allow the shaft 1 to draw usual lubricant present in the enclosure (not shown) of the motor-compressor unit in which the shaft operates. The oil drawn by the cap 23 rises through the cavity 5 and passes through an aperture 26 provided in the part 11 of said body 2, and along a channel 27 provided in the surface of this part, to be distributed to the compression means for their lubrication.

The shaft construction requires little time. Starting from a hollow tube, it is deformed (preferably cold) to form the collar 13 with the part 13A lying in a plane perpendicular to the axis K or W of the body 2.

The counterweight 18 is constructed simultaneously for example from a blanked plate, by bending the plate back.

The counterweight is then mounted on the collar and the arms 20 are snap-inserted into the seat 21 to bring the part 19 of the counterweight into contact with the flange 13B of the collar 13.

Because of the configuration of the shaft 1, arranging the counterweight 18 on the collar 13 results in the counterweight being perfectly balanced about the shaft 1.

In any event, again because of said configuration it is no longer necessary (in contrast to known constructions) to ensure that the counterweight is perfectly perpendicular to the axis of the drive shaft body as the counterweight does not cooperate in any manner with the compressor casing for the purpose of supporting the shaft on this casing.

A shaft formed in accordance with the invention is therefore of speedy construction and simple preparation for use.

In addition, the modular form of its component pieces allows their easy storage and transportation. Once assembled, the resultant drive shaft has a reliability which is totally comparable with known constructions.

One embodiment of the invention has been described. However, other embodiments of the invention are possible (for example with the collar extending about the entire outer surface of the body), all of which fall within the scope of the present document.

## Claims

1. A motor-compressor unit, in particular for refrigerators, of the type comprising an electric motor rotating an output or drive shaft having its own lateral surface and arranged to drive usual means for compressing a fluid, in particular a refrigerant fluid, there being provided a compressor casing relative to which the shaft

moves, characterised in that the drive shaft (1) comprises a collar (13) projecting from said lateral surface (S) and extending about at least part of its circumference, said collar (13) acting as a support for a counterweight (18) having at least a part (17) resting on it.

2. A motor-compressor unit as claimed in claim 1, characterised in that the collar (13) is arranged between two parts (11, 12) of the drive shaft (1) which have their axes (K, W) parallel but not coinciding.

3. A motor-compressor unit as claimed in claim 2, characterised in that the collar comprises a lower portion (13F) arranged to cooperate with the compressor casing in such a manner as to support the drive shaft (1) on this latter.

4. A motor-compressor unit as claimed in claim 2, characterised in that the drive shaft (1) comprises a body (2) which is deformed, preferably cold-formed, in such a manner as to define the collar (13), said collar comprising two superposed parts (13A, 13B), of which at least one (13A) lies in a plane perpendicular to the parts (11, 12) defined on said body (2).

5. A motor-compressor unit as claimed in claims 1 and 4, characterised in that the counterweight comprises two portions (17, 19) arranged to cooperate with the parts (13A, 13B) of the collar (13), a first portion (17) resting on a corresponding part (13A) of the collar (13) and the second portion (19) lying about the collar (13).

6. A motor-compressor unit as claimed in claim 5, characterised in that the counterweight (18) is a metal plate blanked and bent to define its two different portions (17, 19).

7. A motor-compressor unit as claimed in claim 1, characterised in that the counterweight (18) comprises projecting arms (20) arranged to snap-cooperate with the body (2) of the drive shaft (1).

8. A motor-compressor unit as claimed in claim 7, characterised in that the two projecting arms (20) are arched, are elastically deformable and cooperate with an annular seat (21) provided in the body (2) of the drive shaft (1).

9. A motor-compressor unit as claimed in claim 1, characterised in that the drive shaft (1) cooperates with a dip element (23) arranged to draw lubricant present in the motor-compressor

sor unit and feed it into a cavity (5) in the shaft (1), said cavity opening (at 6, 7) at the ends (8, 9) of the body (2) of said shaft (1).

10. A motor-compressor unit as claimed in claim 2, characterised in that the shaft comprises, in that part (11) which cooperates with the compression means, a hole (26) communicating with its cavity (5) and a surface channel (27).

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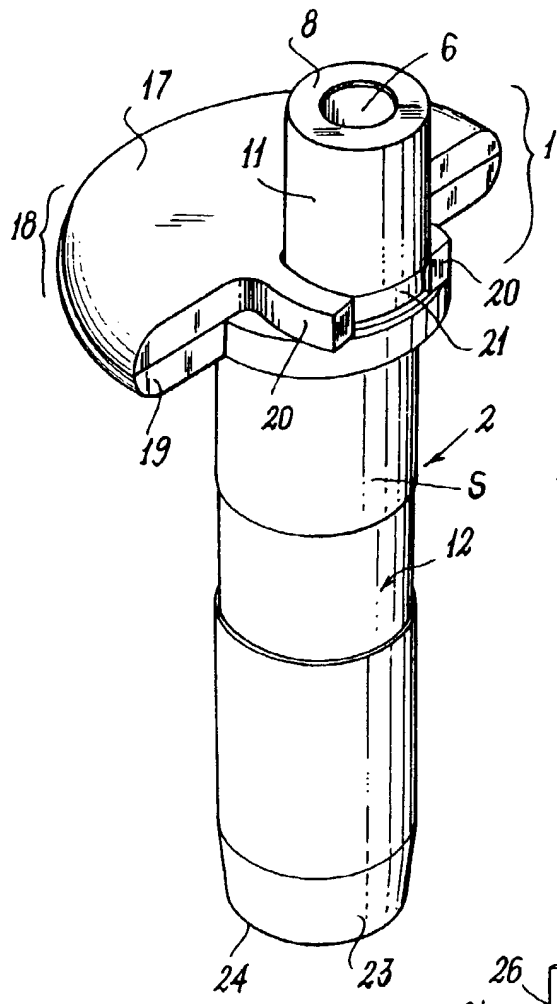


Fig. 1

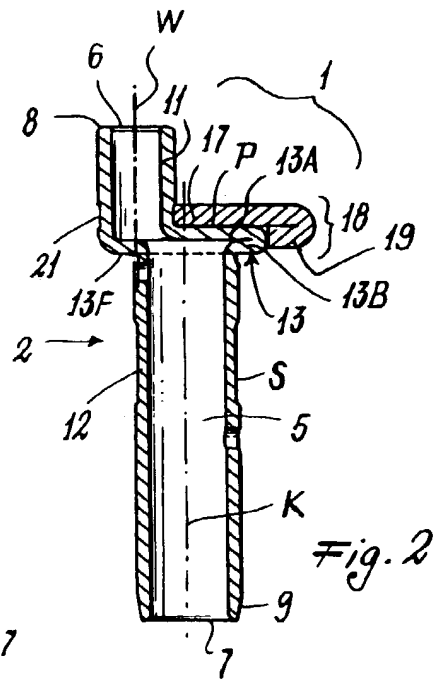


Fig. 2

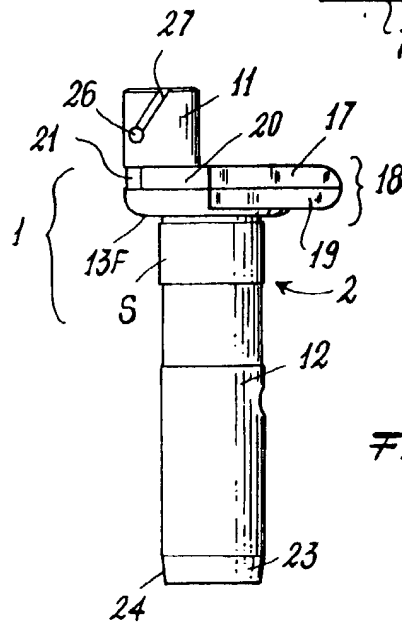


Fig. 3



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## EUROPEAN SEARCH REPORT

Application Number

EP 92 11 9885

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	PATENT ABSTRACTS OF JAPAN vol. 6, no. 263 (M-181)(1141) 22 December 1982 & JP-A-57 157 079 ( SANYO DENKI K.K. ) * abstract *	1	F04B39/00 F16C3/22
A	BE-A-372 672 (RINGFEDER G.M.B.H.) * the whole document *	1	
A	GB-A-2 103 759 (ASPERA)		
P,A	EP-A-0 491 222 (SCHÄFER)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F04B F16C F16B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 JUNE 1993	Examiner VON ARX H.P.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons * : member of the same patent family, corresponding document			

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